CSE318 AI
offline-3
2105118

Heuristics :

1. Orb Count Difference :

    Formula : orb_diff = total_orbs_AI - total_orbs_opponent
    Rationale : the more orbs you have, the more explosive power you   hold. By maximizing orb count, the AI aims to dominate the game early   and build pressure on the opponent. It's an aggressive and   straightforward strategy.

    Category : Offensive

2. Controlled Cell Count Difference :

    Formula : cell_diff = cell_count_AI - cell_count_opponent
    Rationale : This heuristic focuses more on controlling cells than   building power. The AI spreads out, aiming to hold more space, which   can offer long-term strategic benefits like flexibility and map control. It's   a more cautious, balanced approach.

    Category : Balanced

3. Number of Critical Own Cells :

    Formula : critical_cells = near_critical_AI - near_critical_opponent
    Rationale : These near-critical cells can trigger chain reactions and   dominate nearby enemy cells. The AI uses this to build up explosive   opportunities and strike when the moment is right. It's aggressive and   rewards precise timing.

    Category : Offensive

4. Total Adjacent Cells :

    Defn : Counts the total number of adjacent cells around the AI's cells.
    Rationale : The more connections a cell has, the more options it   provides for expansion, attack, or defense. This helps the AI stay active   in well-connected areas of the board, maximizing its strategic choices.

    Category : Balanced

5. Own Support :

Defn : Counts the total number of orbs in neighboring AI-owned cells.
Rationale : Cells that are backed up by friendly neighbors are harder   to eliminate and can quickly retaliate. This heuristic helps the AI form   clusters and defend its position effectively. It promotes resilience and   cooperation among the AI's cells.

Category : Defensive

6. Opponent Support:

Defn: Counts the total number of opponent orbs in cells adjacent to AI's   cells.
Rationale : It helps the AI stay alert to high-risk zones. If enemy orbs   are heavily concentrated around a cell, it's likely to be targeted next.   This heuristic guides the AI to play more cautiously and avoid   dangerous areas.

Category : Defensive

Result :

Heuristic	vs	Depth	winning rate	avg time to win	tradeoffs
Orb Count	Human	2	90%	65.8 s	*Best*
		3	85%	75 s	(guessable pattern-> plays defensively)
Cell Count	Human	2	80%	70s	tries to fill the cells first
		3	85%	77s	"
Critical Cell Count	Human	3	50%	40s	(donot explode, just increase cc)
Adjacent Cell count	Human	3	40%	55s	(try to minimize adj cell, rarely explode)
Own Support	Human	3	30%	35s	(donot explode where needed)
Opponent Support	Human	2	40%	40s	-
	Human	3	75%	100s	plays defensively to delay loosing

Random move vs AI :

Heuristic	vs	Depth	winning rate	avg time to win

Orb Count	Random	2	100%	4 min
		3	100%	6 min
Cell Count	Random	2	95%	8 min
		3	95%	9 min
Critical Cell Count	Random	3	85%	10 min
Adjacent Cell count	Random	3	60%	8 min
Own Support	Random	3	50%	10 min
Opponent Support	Random	2	70%	9 min
	Random	3	85%	7 min